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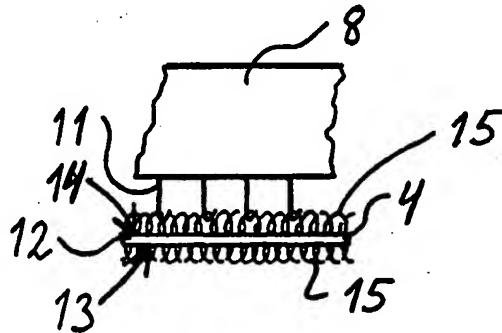
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(54) Title: A METHOD FOR MANUFACTURING A MOP

(57) Abstract

There is described a method for manufacturing a mop cloth (4, 7). The mop cloth is intended for fastening to a mop plate (8) by engagement between Velcro®-hooks (11) on the mop plate (8) engaging loops (15) projecting from the base structure (12) of the mop cloth. This is achieved by manufacturing the mop from pre-oriented yarns knitted in a partly stretched, but not fixed condition, and that said pre-oriented yarns retract, preferably by heating, to recover their former unstretched condition. By the retraction of the pre-oriented yarns, the other yarns in the knitting will raise and form a compact pile. Said pile also forms the loops (15) serving as Velcro®-loops.



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A METHOD FOR MANUFACTURING A MOP

Background of the Invention

The present invention relates to a method for manufacturing a mop having a front side
5 and a back side.

The present invention has come about as a solution to a specific problem. However,
the product which is manufactured may also be used to advantage in other connec-
tions.

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By the manufacture of floor mops, there have been different methods of fastening the
mops to a mop plate. Various mechanical clamping devices have been suggested.
Also, the use of a Velcro-lock has been suggested.

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The known solutions have resulted in the manufacture of a mop to the back side of
which one part of the Velcro-lock is fastened, whereas the other part of the Velcro-
lock is fastened to the mop plate. However, the known mop possess several disadvan-
tages. Thus, the price of manufacturing the mops is high, because of the manufacture
of separate elements, mop cloth and Velcro-fasteners and a sewing together of these
elements. Furthermore, it has turned out that laundering such mops is difficult, as they
will become very stiff and unhandy.

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The stiffness of the mop is, however, necessary with regard to the use of the mop.
When a user throws the mop on the floor in wet condition, it must be so stiff that it
does not curl up. Hereby, the user can place the mop plate against the back side of the
mop in a simple manner and thereby engage the fastening means (the Velcro-lock).

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Furthermore, when manufacturing knitted/crocheted products, there is a need for a
simple and economic manufacture of a knitwear having a compact and wear-resistant
pile, and which simultaneously can be draped. Such knitwear may for example be

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used for garments or for car/furniture covers. In the known knitwear it is difficult to achieve both a wear-resistant pile and a good drapability.

It is the object of the present invention to provide a method of manufacturing a mop which eliminates the above disadvantages and which simultaneously allows a simple and cheap manufacture of a mop and with new areas of use for the formed products.

According to the present invention this is achieved with a method characterised in that the front side and the back side are made integral, and that the mop comprises pre-oriented yarns, that the pre-oriented yarns are knitted together with the other yarns, and that after the knitting the mop is heated such that the pre-oriented yarns retract and recover their former unstretched condition.

By the knitting, the pre-oriented yarns will be in a partly stretched but not fixed condition, which preferably is established by the spinning of these yarns. When the yarns are heated and retract, the other yarns will be pressed outwards and thereby the mop is given a compact and raised pile. The retraction is achieved by the heating, as the molecules of the pre-oriented yarns will resume their original amorphous structure.

A mop manufactured according to the invention can have a relatively compact pile. The compact pile may be provided both at the front side and at the back side and will preferably be a pile forming loop-shaped means.

There will be a special use for a mop which preferably on the back side has loop-shaped means adapted to fasten the mop to a support member which is provided with hook-shaped means. In this way, it will be possible to manufacture a mop which by means of a Velcro-lock may be fastened to a support member provided with the hook-shaped means forming part of the Velcro-lock. However, the mop can also be used in situations where a compact, raised pile is desired for both front side and back side.

As the front side and the back side are made integral, there is no need for mounting fastening means by a separate sewing. These means are provided in the form of the back side of the mop.

- 5 On the back side there are formed loops which are raised from the surface of the mop, such that they may be engaged with hook-shaped means on the support member. As the product is knitted with the pre-oriented yarns partly in a stretched condition, the finished product, after the pre-oriented yarns retract again, will form a mop, wherein the other yarns which are knitted together with the pre-oriented yarns are pressed outwards. Hereby, loops are formed. In practice, it has turned out that these loops provide 10 a good and secure attachment to the hook means in a Velcro-lock.

In practice, it has also turned out that a mop manufactured by the method according to the invention can be given a desired stiffness. As the pre-oriented yarns are stretched 15 to a greater or less extent before the knitting and then after the manufacture of the mop retract to a greater or less extent, it will be possible to give the product more or less stiffness.

Thus, by the method according to the invention it is possible to manufacture mops 20 wherein the desired stiffness can be achieved by employing pre-oriented yarns with a larger or smaller stretching. Thus, by taking into consideration the thickness of the mop and the use of the mop, it will be possible to give a floor mop the requisite stiffness. Hereby it becomes possible to throw a mop in wet condition on the floor without the mop curling up.

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The mop which is lying flat on the floor with the looped back side facing upwards, may then easily be engaged with the hook-shaped projections in a Velcro-lock, which 30 is fastened to the mop plate in a manner known per se. Shrunk, air textured polyester yarns are preferably used for the formation of the loops. Hereby there are formed large loops of a structure which has proved to provide a surprisingly good and secure engagement with the hooks. According to an advantageous embodiment, said air textured yarns will be used in a layer at the back side for forming the loops.

The mop is easily manufactured in endless webs wherein transversely extending cutting lines are provided at intervals. By cutting the web at the cutting lines, products ready for use as mops may be manufactured. The web may thus have a width corresponding to the width of the mop plate and the distance between the cutting lines may correspond to the length of the mop plate.

When mops are manufactured by the method according to the invention, it is an advantage that liquid absorbing yarns, as for example cotton and viscose, are interknitted between the other yarns. Hereby the ability of the mop to absorb and contain water is increased. With consideration to the friction between the mop and the floor, cotton 10 yarns will be knitted with a greater tightness. After the retraction of the pre-oriented yarns, the cotton yarns will thus form shorter loops than the loops formed by textured polyester yarns, preferably shrunk polyester yarns. This minimises the friction.

When the mop is manufactured in endless webs, it will be possible to manufacture a particularly advantageously formed mop. If a transverse area of an open structure is formed immediately adjacent to the cutting lines. The open structure may preferably be made in the form of an area with fringes and will make it possible to hang the mop in the fringe area. Thus, it can be said that the fringe area or the open structure forms a hanger.

If a relatively short web length is knitted in relation to the open area, and this relatively short web length is defined by the cutting line, it will be possible to manufacture a mop where the further web length forms a piece of mop cloth extending beyond the sides of the mop plate. This allows easier cleaning of difficult spots. The user may then exert a larger pressure on the back side of the freely hanging part of the mop with his/her foot and thereby remove particularly difficult dirt on the floor. Furthermore, the loose mop cloth will allow a wiping off of the lower part of boards and walls.

In practice, it has proved advantageous that the pre-oriented yarns are 135-700 dtex, 30 preferably 500 dtex polyester yarns. Said yarns are spun at rates of between 2000-5000 meters pr. minute, preferably 3000 meters pr. minute. Said yarns are combined

in mop products with shrunk polyester yarns which preferably are air textured yarns. These shrunk polyester yarns are interknitted as floatings in the mop whereby a compact pile is achieved while at the same time there is achieved a loop formation which allows a secure fastening of the product on a Velcro-lock.

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The webs will preferably be manufactured by double Raschel knitting. Hereby, it will be possible to combine different yarns which form part of the manufacturing process, and it will also be possible to manufacture the mop with relatively substantial thickness.

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If a double Raschel knitting is employed, it will be possible to manufacture a double-layered structure. Inbetween the layers forming the front side and the back side of the mop, it is possible to interknit yarns of a particularly high absorbency. Such a product will be well suited as cleaning cloths, but may also be used as a sanitary towel.

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A sanitary towel manufactured in this way is particularly desirable, as by appropriate dimensioning of the web width and distance between cutting lines, it is possible to manufacture the sanitary towel in a condition in which it is ready for use. This will be an effective way of manufacturing such sanitary towels. In sanitary towels, the outermost yarns in the layers at the front side and the back side of the knitwear, will preferably be manufactured from non-absorbing, liquid permeable yarns, which permit the passage of the liquid into the liquid absorbing yarns placed between the outer layers. The sanitary towel may be provided with a coating on the outer sides to further the liquid retention. Alternatively, the sanitary towel may also be used directly in fixation panty briefs.

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The absorbency of the sanitary towel may be adapted for the intended use. The sanitary towel may thus be used as a traditional sanitary towel or as an incontinence diaper. By using different degrees of strengthening/retraction in pre-oriented yarns, a larger or smaller compactness/amount of liquid absorbing material (cotton or viscose) may be achieved and thereby a greater or less liquid absorbency.

The product which is manufactured by the method according to the invention may have other areas of use. Thus, the method may advantageously be used in manufacturing fiber fur for bedding where a compact pile is manufactured from cotton or viscose which yields a high absorbency. It will also be possible to use the method for manufacturing fiber fur for paint rollers or paint pads where the compact pile provides for a smooth application of paint. Because of the fixation of the pile in the retracted, pre-oriented yarns, a better fastening of the individual fibres is achieved. Thus, there will be no wearing off of the fibres. Thus, there can be manufactured paint rollers/paint pads which allow of a better painting quality and which last longer.

By using a less degree of retraction, it is possible to achieve a drapability in the manufactured products. Thus, it becomes possible to manufacture a car/furniture cover or textiles for use in the clothing industry. Hereby, there are achieved not only a compact pile, but also a substantial flexibility/good drapability. Furthermore the product may be manufactured with a surface in the form of velour loops. By the manufacture of car/furniture covers there may be used a high degree of retraction, such that the pile is locked very firmly and tight in the base structure. This gives a compact pile of a high wear resistance as is desired in such products.

The method may also be used for manufacturing textiles for lamination for example in connection with car covers. Because of the formed Velcro-loops, there may be achieved an improved attachment ability to e.g. polyether or polyester foam in connection with the lamination of the textiles when car covers are made.

By the manufacturing method there will preferably be used pre-oriented yarns of polyester. However, it will also be possible to use polypropylene yarns, acrylic yarns, pvc-yarns, polyamide yarns, etc.

The pre-oriented yarns will normally not be used directly for manufacturing products by knitting, crocheting or the like. Up till now, such yarns have been a semi-product for yarn manufacturing.

Thus, by the method according to the present invention a relatively cheap yarn is used, as it is only a semi-product and simultaneously, there is achieved a surprising effect which permits the manufacture of products with characteristics providing for a wide range of uses.

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Description of the Drawing

The invention will now be explained in detail with reference to the accompanying drawing, in which

- 10 Fig. 1 illustrates a method according to the invention,
Fig. 2 illustrates a second embodiment of a method according to the invention,
Fig. 3 a partial view illustrating a use of a mop manufactured by the method shown
in Fig. 2,
Fig. 4 a partial, enlarged view of a detail in Figure 3,
15 Fig. 5 a partial view illustrating the appearance of the mop before and after the
heating step, and
Fig. 6 a partial knitting diagram for use by a method according to the invention.

The products which are illustrated in Figures 1 and 2 are manufactured by knitting on
20 a double Raschel knitting machine (not shown). As illustrated in Figure 1, an endless
web 1 is manufactured, wherein at intervals along the length there are formed cutting
lines 2 extending transversely of the longitudinal direction 3 of the web. The web 1 is
heated by a laundering process performed at 95°C. After the laundering, the web is
further heated by a fixation process performed as a hot air process at approx. 185°C.
25 By the cutting separate mops 4 are formed. The fixation may alternatively be per-
formed at a temperature of between 100 and 200°C depending on the pre-oriented
yarns employed. As the web 1 primarily is knitted with pre-oriented polyester yarns, a
shrinkage of 50-70% may be achieved by the heating.

30 By the method there are used pre-oriented yarns of an original amorphous structure.
Before the knitting, these yarns are stretched such that the molecular structure of the
yarns is given a pre-orientation. In practice, this stretching takes place by the spinning

of the yarns. When the yarns are heated after the knitting with the yarns in pre-oriented condition, the molecules will remember their original amorphous structure. The heating results in a reversing of the yarn to the original amorphous structures. This, in turn, results in retraction of the pre-oriented yarns. Hereby, the yarns which are knitted together the pre-oriented yarns will rise and form loops projecting from the base structure of the mop.

The method illustrated in Figure 2 differs from the one illustrated in Figure 1 in that immediately adjacent to the cutting line 2 there is formed a transverse area 5 of an open structure. In the shown embodiment, the open structure is made in the form of an area with fringes 6. Thus, the fringe area 5 forms a hanger which may be used for hanging the finished mop on a cleaning trolley.

As illustrated in Figure 2, adjacent the fringe area 5 there is made a further web portion 7 which is interconnected with the web portion 4. In Fig. 2, the finished mop is thus formed by the two web portions 4 and 7.

Fig. 3 shows a use of a mop cloth manufactured by the method according to Fig. 2. It is shown that the mop is fastened to a mop plate 8. The mop plate is connected via a coupling connection 9 to a mop stick 10, whereby the mop is operated by a user. As can be seen, the outermost web portion 7 forms a piece of mop cloth extending beyond the sides of the mop plate 8. This allows a cleaning of difficult spots in that the user with his/her foot may exert a great pressure on the outermost web portion 7. Furthermore, the projecting part will facilitate demounting the mop from the mop plate 8. The user just steps on the outermost web portion 7 and lifts the mop plate up whereafter the engagement between the mop plate 8 and the mop cloth 4 is released.

The engagement between the mop plate 8 and the mop cloth 4 is established by means of a Velcro-lock as illustrated in Fig. 4. At its lower side, the mop plate 8 is provided with hook-shaped projections forming the hook parts in a Velcro-lock. The mop cloth 4 has a base structure 12 wherfrom at the front side 13 and the back side 14 there are formed projecting loops 15. The loops 15 at the back side 14 constitute loop means in

the Velcro-lock and are used for fastening the mop cloth to the mop plate 8. The loops 15 at the front side of the mop are used for floor cleaning. If a wet mop is manufactured, cotton or viscose yarns are used to achieve sufficient water absorbing effect in the mop cloth. Thus, the cotton yarns/viscose yarns form the loops 15. Said cotton/viscose yarns may form loops on their own. However, it is preferred that the loop-forming yarns also comprise polyester yarns. If cotton is employed, the polyester must be interknitted therewith such that the polyester yarns form longer loops than the cotton loops with regard to minimising the friction of the mop.

10 In Fig. 5, there is shown a mop 16 as is appears after knitting and cutting. The mop will have a length 17. The mop 16 is then exposed to heating by means of heating means 18. The heating means 18 may be comprised of heat radiating means; autoclaving means or other heating means. After the heating, there is produced a modified mop 16' which now has loops 15 projecting from the front side and the back side of the base structure 12. Because of the shrinkage effect, the mop 16' will be produced with another length 19 (just as there will also be a reduced transverse dimension).

20 In Fig. 6, there is shown a partial knitting diagram illustrating a manufacture on a double Raschel knitting machine. Herein is illustrated the positioning of the different yarns used in manufacturing mop cloth by a method illustrated in Fig. 2.

The pre-oriented yarns are indicated by 20. 21 illustrates air extruded polyester yarns intended for the formation of projecting loops whereby the finished mop cloth may be fastened to the mop plate. 22 illustrates polyester yarns intended for interknitting by formation of the base structure of the mop cloth. The yarns 23 are polyester yarns intended for formation of a compact pile in the surface of the mop. Instead of using just polyester yarns 23, there may also be used a combination of polyester and cotton. Thus, there may possibly be used a guide bar with polyester yarns and a guide bar with cotton yarns. The yarns 24 are wound yarns that may possibly comprise elastan. These are used to form a relatively firm form stable edge on the mop. The knitting is effected in the longitudinal direction 3 of the web. That part of the web which is indi-

cated by 25 is the open area wherein there are formed fringes in the finished web. The area indicated by 26 is the area of the base web of the mop cloth 4.

To form as high a pile as possible on the front side of the mop, there may be used soluble yarns 27 in a manner known per se. The soluble yarns 27 are interknitted on the needle bars of the double Raschel machine. When the soluble yarns 27 are dissolved, they will form a higher pile on the front side of the mop according to a known principle. Thus it becomes possible to achieve a high pile and a compact pile. The compactness of the pile is established by the retraction of the pre-oriented yarns after the knitting.

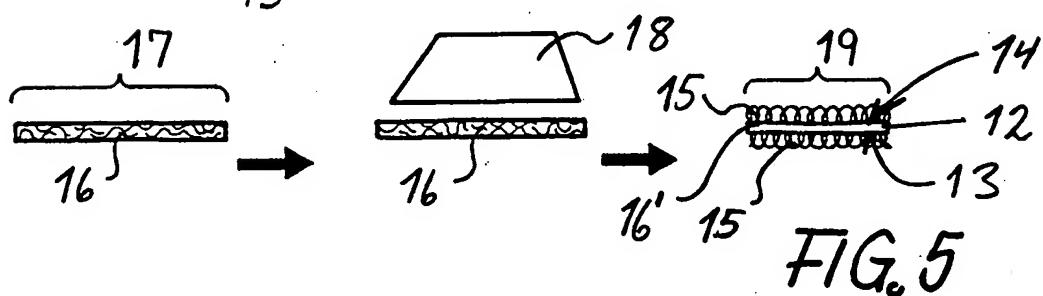
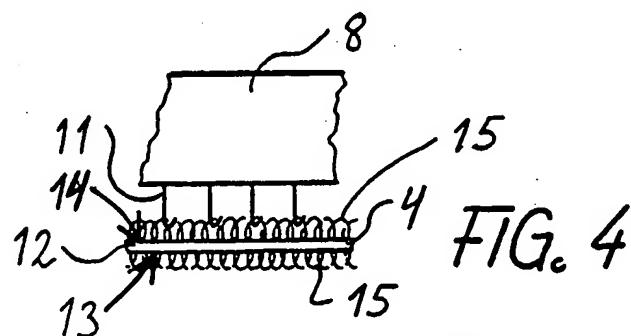
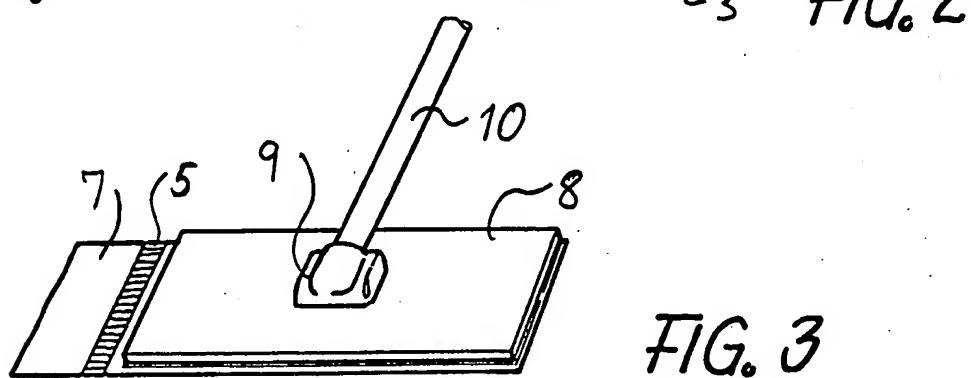
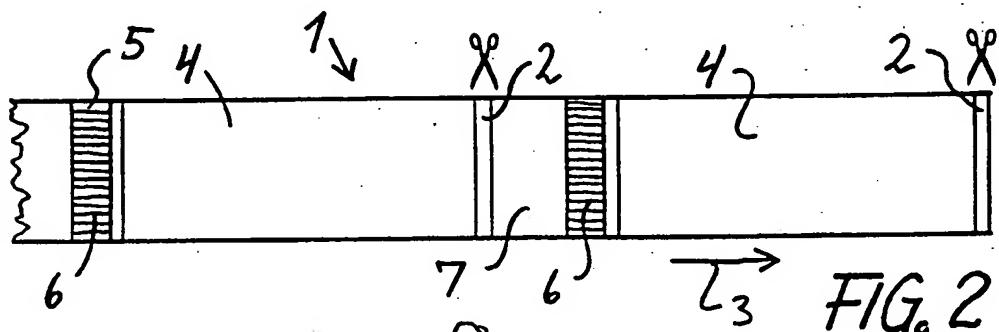
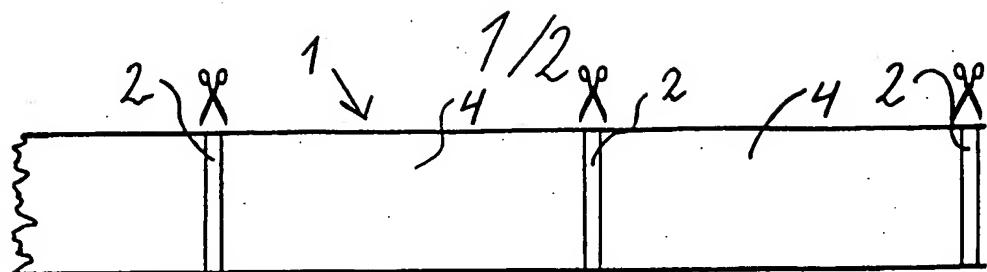
It will be possible to vary the pile height by varying the distance between the needle bars and the striker bars.

The knitting diagram is a partial knitting diagram wherein a part of the yarns are omitted, just as a part of the areas in the longitudinal direction are omitted.

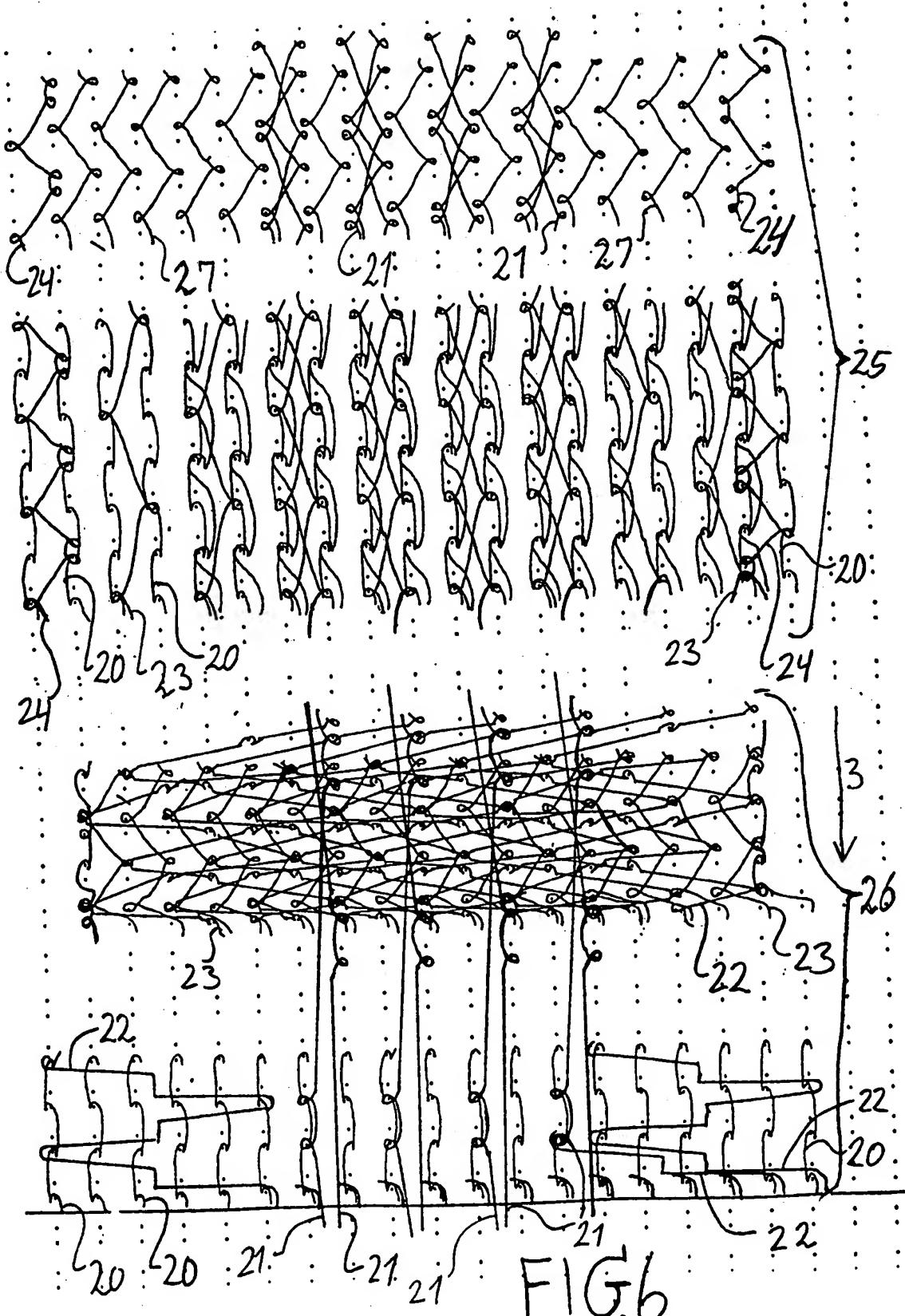
CLAIMS

1. A method for manufacturing a mop having a front side and a back side, characterised in that the front side and the back side are made integral, and
5 that the mop comprises pre-oriented yarns, that the pre-oriented yarns are knitted together with other yarns, and that the mop after the knitting is heated so that the pre-oriented yarns retract and recover their former unstretched condition.
2. A method according to claim 1 for manufacturing a mop, the back side of which
10 comprises loop-shaped means adapted to fasten the mop on a support member provided with hook-shaped means characterised in that the pre-oriented yarns at least are interknitted in a layer at the back side.
3. A method according to claim 1 or 2 characterised in that liquid absorbing
15 yarns, as for example cotton and viscose, are interknitted between the pre-oriented yarns.
4. A method according to any one of the preceding claims, characterised in that 135 - 700 dtex, preferably 500 dtex, polyester yarns are used as pre-oriented
20 yarns, that these are spun at 2000 - 5000 m/min, preferably 3000 m/min, combined with textured yarns which are interknitted in the mop as floatings.
5. A method according to any one of the preceding claims characterised in that the mop is manufactured by double Raschel knitting.
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6. A method according to any one of the preceding claims characterised in that the mop is manufactured in endless webs, that cutting lines extending transversely of the longitudinal direction of the web are knitted at intervals along the length of the web, and that the web is cut at said cutting lines to form separate mops.

7. A method according to claim 6 characterised in that immediately adjacent to a cutting line, there is knitted a transverse area of an open structure, preferably in the form of an area with fringes.
- 5 8. A method according to claims 1 and 3 characterised in that the mop comprises a double-layered structure, a layer being formed at the front side and the back side of the mop, and that the liquid absorbing yarns are interknitted between the two outer layers.
- 10 9. A method according to claim 8 characterised in that the cotton yarns are knitted more tightly, such that after the retraction of the pre-oriented yarns, they form shorter loops than textured polyester yarns interknitted as said other yarns in the base structure of the mop.
- 15 10. A mop having a front side and a back side made integral characterised in that the base structure of the mop comprises pre-oriented, retracted yarns which are knitted together with other yarns, preferably polyester, cotton and viscose, forming a compact and raised loop-forming pile.



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INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER

IPC6: A47L 13/20, D04B 1/04

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B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: A47L, D04B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPI, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0336507 A1 (VISCOSUISSE SA), 11 October 1989 (11.10.89), column 2, line 33 - line 38, claims 1-6 --	1,4,10
A	Patent Abstracts of Japan, Vol 17, No 496, C-1108 abstract of JP 5-125658 A (UNITIKA LTD), 21 May 1993 (21.05.93) --	1,10
A	WO 8801845 A1 (VANESSA AB), 24 March 1988 (24.03.88), claim 1 --	1-2,10

 Further documents are listed in the continuation of Box C. See patent family annex.

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International application No.

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 9610946 A1 (ACTUELLE TRICOT I BORAS AB), 18 April 1996 (18.04.96), page 6, line 1 - page 8, line 12 --	1-10
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INTERNATIONAL SEARCH REPORT

Information on patent family members

27/07/98

International application No.

PCT/DK 98/00257

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